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Heat Loss by Wall Resistivity

Parameters: resistivity 0.55×10^{-6} ohm-m
wall diameter 2.6"

length (cold region) 5,860 m

Bunch distribution:

(83 full) + (1 empty) + (83 full)+.....+(83 full)+(22 empty)

total number of full bunches 1,079

Total number of empty bunches 34

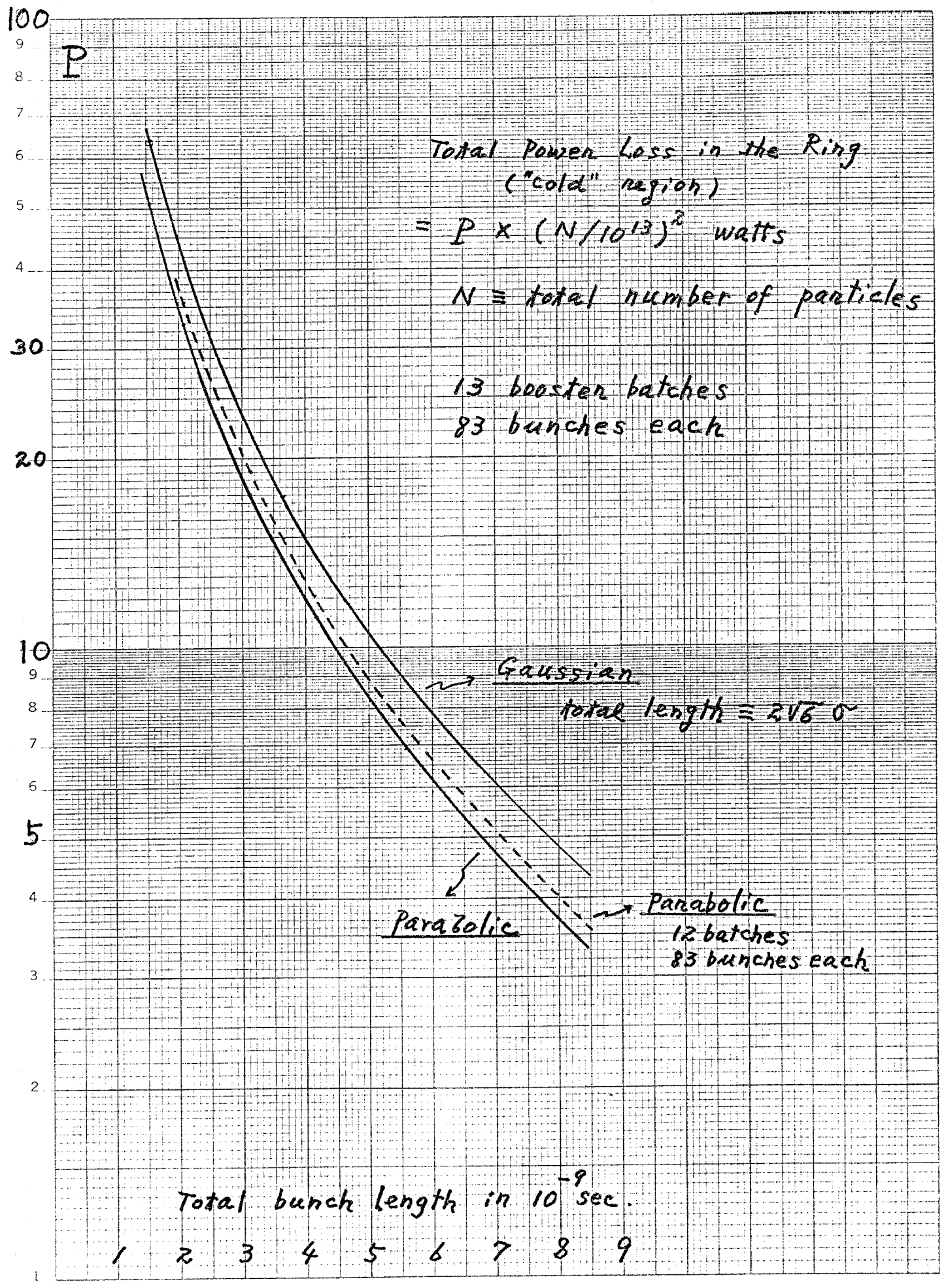
all bunches identical in the charge distribution and in the number of particles

Shape of charge distribution: Gaussian and parabolic

Results are shown in the attached figure. The total loss in the ring is

$P\ N^2$ watts for the total number of particles=$N\ 10^{13}$

For the Gaussian distribution, the total bunch length is defined to be 2 6 . The contribution from the harmonic numbers n = 1,113, 2,226, 3,339,.... is 96% to 97% of the total. If there are twelve batches of 83 bunches, the contribution from these harmonic numbers comes down to 89%.


P
100
9
8
7
6
5
4
30
20
10
9
8
7
6
5
4
3
2
1
Total Power Loss in the Ring
("cold" region)
= P × (N/10^13)^2 watts
N ≡ total number of particles
13 booster batches
83 bunches each
Gaussian
total length = 2√6 σ
Parabolic
Parabolic
12 batches
83 bunches each
Total bunch length in 10^-9 sec.
1 2 3 4 5 6 7 8 9